

## **REMARKS**

Claims 1-27, 29-30, 32-70, and 72-92 are pending in the application. Claims 1, 29, 39, 52, 72 and 74 are currently amended. Claims 28, 31 and 71 have been previously cancelled. Claims 84-92 have been previously withdrawn without prejudice.

Claims 1, 29, 39, 52, and 72 have been amended to recite that the vegetable oil-based polyol is prepared by:

(a) adding a peroxyacid to vegetable oil, wherein said peroxyacid and said vegetable oil react to form an epoxidized vegetable oil, and (b) adding said epoxidized vegetable oil from step (a) to a mixture comprising an alcohol, water, and fluoboric acid, wherein said epoxidized vegetable oil reacts with said mixture to form said vegetable oil-based polyol. Support can be found in Col. 2, lines 31-41 of U.S. Patent 6,107,433 which has been incorporated by reference in the instant application as originally filed.

No new matter has been introduced by the present amendments.

### **I. Claim Objections**

Claim 74 stands objected to as being improper dependent form. Claim 74 has been amended. Withdrawal of the objection is respectfully requested.

### **II. Claim Rejections-35 U.S.C. 112 first paragraph-Enablement.**

Claims 1-27, 29-30, 32-70 and 72-83 stand rejected under 35 U.S.C. 112 first paragraph for lack of enablement.

Claims 1, 29, 39, 52, 72 have been amended to recite that the vegetable oil-based polyol is prepared by:

(a) adding a peroxyacid to vegetable oil, wherein said peroxyacid and said vegetable oil react to form an epoxidized vegetable oil, and (b) adding said epoxidized vegetable oil from step (a) to a mixture comprising an alcohol, water, and fluoboric acid, wherein said epoxidized vegetable oil reacts with said mixture to form said vegetable oil-based polyol.

The “enablement requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation.” *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244 (Fed. Cir. 2003). Whether making and using an invention would have required undue experimentation is a legal conclusion based upon underlying factual inquiries. Applicant agrees with the Examiner that a number of factors as

set forth in *In re Wands* may be considered to determine whether an application is enabling. However, Applicant differs from the Examiner with respect to how these factors are to be applied. These factors are discussed in the following text.

(A) The breath of the claims.

Applicant agrees that the term vegetable oil-based polyols may potentially encompass a large number of compounds. The functional moieties react in the same way.

(B) The nature of the invention.

The novel aspect of the instantly claimed invention is not the discovery or invention of vegetable oil-based polyols per se; rather, the what is claimed addresses specific uses of these materials to make polymer concrete with improved qualities.

(C) The state of the prior art.

As Applicant disclosed:

U.S. Pat. No. 6,107,433, which is hereby incorporated by reference to the same extent as though fully replicated herein, describes advancements in the art of polyurethane chemistry through the use vegetable oil-based polyols. The materials are less harmful to the environment than prior polyols in use, and they originate from renewable plant resources, such as soybean plants and the like. Vegetable oil-based polyols are formed by reacting a peroxyacid with vegetable oil to form an epoxy group. The epoxidized vegetable oil is added to a mixture of alcohol, water, and a catalytic amount of fluoboric acid to yield a vegetable oil-based polyol.

*See* page 3 of the Specification as originally filed.

Thus, the protocols for making a vegetable oil-based polyol from vegetable oil had been described in the prior art at the time of Applicant's invention. The claims address specific ranges of materials that impart improved and unexpected properties to polymer concrete materials.

(D) The level of one of ordinary skill in the art.

The level of skill in the field is moderate.

(E) The level of predictability.

The performance improvements that are extensively documented in the application could not have been predicted on the basis of the prior art; however, the results are in hindsight entirely predictable on the basis of Applicant's disclosure.

(F) The amount of direction provided by the inventor.

Applicant has provided detailed in the form of working examples and general directions. See Example 1 on page 24 and the description provided on pages 3 and 5, as well as the disclosure of U.S. Patent No. 6,107,433 ('433 patent) which is incorporated into the instant application by reference.

(G) The existence of working examples.

Applicant has provided a great many working examples on how to prepare the vegetable oil-based polyols. See e.g., Example 1 on page 24 and the description on pages 3 and 5 with respect to the use of different types of vegetable oils.

(H) The quantity of experimentation needed to make or use the invention.

The experimentation required to prepare vegetable oil-based polyol from vegetable oil contains only a few steps of chemical reactions as described in the Specification and the '433 patent, which have now been recited in independent claims 1, 29, 39, 52, 72. Although the potential number of vegetable oil-based polyols is large, the preparation of a vegetable oil-based polyol from its respective vegetable oil is routine experimentation that has been taught by Applicant and the prior art.

According to *In re Bowen*, 492 F.2d 859, 862-63, 181 USPQ 48, 51 (CCPA 1974), the minimal requirement for establishing nonenablement is for the examiner to give reasons for the uncertainty of the enablement. MPEP 2164.04. In the case where the Examiner believes that certain information is missing about one or more essential parts or relationships between parts which one skilled in the art could not develop without undue experimentation, the examiner should specifically identify what information is missing and why one skilled in the art could not supply the information without undue experimentation. *Id.*

Here, Applicant teaches that vegetable oil-based polyols may be prepared by reacting the vegetable oil with a peroxyacid to form an epoxy group followed by addition of the epoxidized vegetable oil to a mixture of alcohol, water, and a catalytic amount of fluoboric acid. See lines 10-13, page 5 of the Specification. More parameters of the reaction, such as temperature, pressure, volume, etc, can be found in, for example, Example 1 of the '433 patent. In rejecting Applicant's claims for lack of enablement, the Examiner has not provided any reasoning or evidence showing the uncertainty of preparing a vegetable oil-based polyol from its respective vegetable oil. Rather, the Examiner appears to be relying

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heavily on the factor that there are allegedly infinite number of vegetable oil-based polyols. As the MPEP makes clear, the quantity of experimentation needed to be performed by one skilled in the art is only one factor involved in determining whether “undue experimentation” is required to make and use the invention. See MPEP 2164.06, citing *In re Wands*, “[t]he test is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed.” The Examiner has not identified what information is missing in Applicant’s description for making a vegetable oil-based polyol from its respective vegetable oil which would require undue experimentation by one of skill in the art.

In *In re Bowen*, the board’s non-enablement rejection was reversed where the claims literally comprehend numerous polymers in addition to the one specifically described in appellant’s specification because no persuasive reason was given by the Patent Office why the specification does not realistically enable one skilled in the art to practice the invention as broadly as it is claimed. *Bowen*, at 863. Here, the conversion of vegetable oil to vegetable oil-based polyols is a relatively simple chemical reaction. The steps of this reaction are now recited in the independent claims. If the Examiner disagrees with this assessment, Applicant respectfully requests more specific reasoning from the Examiner explaining why one of skills in the art cannot prepare the vegetable oil-based polyol needed to practice the claimed invention by:

- (a) adding a peroxyacid to vegetable oil, wherein said peroxyacid and said vegetable oil react to form an epoxidized vegetable oil, and
- (b) adding said epoxidized vegetable oil from step (a) to a mixture comprising an alcohol, water, and fluoboric acid, wherein said epoxidized vegetable oil reacts with said mixture to form said vegetable oil-based polyol.

In other words, Applicant respectfully requests that the Examiner point out what undue experimentation is missing from the present application and would need to be carried out by one of skills in the art to practice the instant invention.

The Examiner has cited *Sitrick v. Dreamworks, LLC* in rejecting the instant claims. *Sitrick v. Dreamworks, LLC*, 516 F.3d 993 (Fed. Cir. 2008). In *Sitrick*, the patentee's disclosure taught how to integrate audio or video signals into a video game but did not teach how the same can be done for movies. The Court recognized that movies differ from video games in several aspects. For example, unlike video games, movies do not have easily separable character functions which makes the process of integrating IAIS signals into a video game different from the process for doing the same in movies. By contrast, in the present case, all vegetable oils have substantially similar chemical structure, and the process of converting one vegetable oil into a polyol is very similar, if not identical, to the process of converting another vegetable oil into a polyol. Thus, the full scope of the claims are enabled. For the foregoing reasons, Applicant respectfully requests that the rejection for non-enablement be withdrawn.

### **III. Claim Rejections – Obviousness-type Double Patenting**

Claims 1-16, 20-27, 29-30, 32-70, and 72-83 stand rejected for obviousness-type double patenting over claims 1-12 of United States Patent 6,686,435 (the '435 Patent). Applicant has amended claim 1 to recite that the glycerine is present in an amount ranging from 5 parts per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol. respectfully disagrees with the Examiner's analysis. App

A double patenting rejection of the obviousness-type is "analogous to a failure to meet the nonobviousness requirement of 35 U.S.C. 103" except that the patent principally underlying the double patenting rejection is not considered prior art. *In re Braithwaite*, 379 F.2d 594, 154 USPQ 29 (CCPA 1967). Therefore, the analysis employed in an obviousness-type double patenting rejection parallels the guidelines for analysis of a 35 U.S.C. 103 obviousness determination. *In re Braat*, 937 F.2d 589, 19 USPQ2d 1289 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985). Since the analysis employed in an obviousness-type double patenting determination parallels the guidelines for a 35 U.S.C. 103(a) rejection, the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 should be employed when making an obvious-type double patenting analysis. MPEP Section 804.

These factual inquiries are summarized as follows:

- (A) Determine the scope and content of a patent claim relative to a claim in the application at issue;
- (B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue;
- (C) Determine the level of ordinary skill in the pertinent art; and
- (D) Evaluate any objective indicia of nonobviousness.

The conclusion of obviousness-type double patenting should be made in light of these factual determinations. Any obviousness-type double patenting rejection should make clear:

- (A) The differences between the inventions defined by the conflicting claims — a claim in the patent compared to a claim in the application; and
- (B) The reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim at issue is anticipated by, or would have been an obvious variation of the invention defined in a claim in the patent.

*Id.* The present invention represents a distinctive improvement over the invention claimed in the ‘435 patent and is not obvious over the ‘435 patent for the reasons stated below.

First, Claim 1 of the instant application, as amended, recites a crosslinker comprising glycerine, which is present in an amount ranging from 5 part per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol. Claims 2-27, and 32-38 all depend directly or indirectly from Claim 1 and necessarily incorporate all limitations of Claim 1. The ‘435 patent never discloses or contemplates use of glycerine as a crosslinker. However, the Examiner maintains that the polyol of the ‘435 patent inherently contains glycerine at the concentration as Applicant has claimed. *See* page 9 of the Office Action dated April 15, 2009, stating “[i]t is not seen that this molecular weight fraction is not glycerine ...” The Examiner further maintains that the ‘435 patent inherently discloses the presence of glycerine in the amount now claimed by Applicant, namely, from 5 part per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol.

“Inherency ... may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981). *See also, Ex parte Skinner*, 2 USPQ2d 1788, 1789 (BPAI), stating “the examiner must provide some evidence or scientific reasoning to

establish the reasonableness of the examiner's belief that the functional limitation is an inherent characteristic of the prior art before the burden is shifted to applicant to disprove the inherency. Here, Examiner improperly shifts the burden to disprove inherency to Applicant before the Examiner first proves inherency.

The only reasoning offered by the Examiner to establish inherency is that the patentee's processing "necessarily and inherently give the instantly claimed amounts of glycerine since such molecules may hydrolyze under the condition used by the patentee in making the polyols particularly where water is present." Page 9 of the Office Action dated April 15, 2009. The Examiner ignores the many teachings in the '435 patent where the patentee repeatedly cautions that undesirable side-reactions such as hydrolysis should be avoided. *See e.g.*, lines 2-11, Col. 5, stating that "higher catalyst concentration promotes undesirable side-reactions such as hydrolysis, transesterification and crosslinking ..." and "[a]t that concentration of dissolved epoxidized natural oil, the conversion of epoxy group is the fastest, and undesirable reactions are minimal." Thus, the '435 patent, if anything, teaches away from forming glycerine because undesirable side-reactions such as hydrolysis and esterification would decrease the yield of the main product. Given the '435 patentee's statement that the side-reactions should be kept to the minimal and the products of such side-reactions are negligible, it is purely speculative for the Examiner to state that the amount of glycerin in the polyols of the '435 patent fall within Applicant's claimed range of 1 part per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol. *See e.g.*, lines 41-47, Col. 5 of the '435 patent.

Even if we take the Examiner's position that the polyol of the '435 patent contains glycerine, the '435 patent still lacks any teaching or suggestions as to the specific amounts of glycerine, namely, from 5 parts per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol, as is now recited by amended claim 1. As evidenced by the numerous examples and figures in the instant application, the amounts of glycerine crosslinker has a significant effect on the mechanical property of the final product and is not obvious to one of skill in the art at the time of Applicant's invention.

The Examiner further stated that the '435 patent does teach removing glycerine, if any, from the polyols derived from the vegetable oils. Lines 5-8 on page 12 of the instant Office Action. Applicant respectfully disagrees. Examples 1-10 of the '435 patent all teach

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a step whereby the excess water and alcohol were removed. See e.g., Col. 6, lines 4-7 of the '435 patent. According to the '435 patent, the solubility of the polyol decreases drastically from 100% to 7.5% when water is present at between 10-30% by weight. Thus, even if any glycerine, or other low MW polyols, have been formed during the process of making the polyols, because glycerine dissolves readily in water, they would have been removed with the "excess water and alcohol" at the end of the reaction and therefore be separated from the vegetable oil based polyols that are to be used in subsequent steps. Given the specific teaching of removing the glycerine and the low MW polyols, it is purely speculative to maintain that glycerine is still present in the vegetable oil based polyols at from 5 parts per hundred to 30 parts per hundred by weight of said vegetable oil-based polyols.

Secondly, independent Claim 29, as previously amended, recites that the low molecular weight polyol has a molecular weight less than one-half of the molecular weight of the vegetable oil-based polyol, and that the low molecular weight polyol is present at from 1 pph to 10 pph based upon the weight of said vegetable oil-based polyol. Even if we take the Examiner's position that the polyol of the '435 patent has dual functionalities, the '435 patent still lacks any teaching or suggestions as to the specific amounts of the low molecular weight polyol to be used as a crosslinker. As evidenced by the numerous examples and figures in the instant application, the amounts of the low molecular weight polyol such as glycerine has a significant effect on the mechanical property of the final product and is not at all obvious to one of skill in the art at the time of Applicant's invention.

Third, Claims 24-27, 47-50 and 68-70 all recite the presence of pea gravel at certain percentage in the claimed composition. The '435 patent never discloses or suggests the use of pea gravel in the claimed amount in the composition. The Examiner has not provided any reasoning as to why it would be obvious for one of skill in the art to include the claimed amount of pea gravel in the polymer concrete composition.

Last but not the least, Claims 17-19 recite a ratio between the isocyanate moieties in the isocyanate and the hydroxyl moieties in the vegetable oil-based polyol. For instance, Claim 17 recites that ratio between the isocyanate moieties in the isocyanate and the hydroxyl moieties in the vegetable oil-based polyol ranges from 1.02 to 1.15. The '435 patent never discloses or suggests such a limitation.



Thus, because claims 1-12 of the '435 patent are distinguishable from the instant claims, and the Examiner fails to establish a prima facie case of obviousness with respect to the instant claims. Withdrawal of the rejection of obviousness-type double patenting is respectfully requested.

#### **IV. Claim Rejections – 35 U.S.C. §102(b)**

Claims 29-30, 39-52, 54-60, 63, 67-70, 78-81 and 83 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 2,902,388 to Szukiewicz (“Szukiewicz”). Applicant respectfully traverses this rejection and requests withdrawal of same.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Rejected claims 51 and 72, and their dependent claims recite the use of glycerine in a specific amount as a crosslinker. For instance, Claim 72 recites glycerine in an amount ranging from 5 part per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol, and Claim 51 recites glycerin in an amount of from 5 pph to 10 pph by weight of the soy polyol. Rejected claims 29, 39 and 52 and their dependent claims recite the use of a low molecular weight polyol in a specific amount as a crosslinker. Although Szukiewicz teaches a hydraulic cement-polyurethane composition containing polyols, there is no mention of a crosslinker comprising a low molecular weight polyol as defined, nor does Szukiewicz disclose the use of glycerine in the amount claimed by the Applicant.

The Examiner points to lines 60-62 on Col. 2 of Szukiewicz as evidence that Szukiewicz anticipates the present claims. Applicant respectfully disagrees. Lines 40-68 of Col. 2 summarize suitable “polyols” to be used for the Szukiewicz disclosure. Lines 42-49 disclose the first category of suitable “polyols” which are vegetable oil such as castor oil or other glycerides. Lines 50-63 summarize the use of polyester-polyol co-polymers as the second category of suitable “polyols”. Lines 64-67 summarize the third category of “polyols” to be used, namely, polyalkylene glycols. Although Szukiewicz mentions that a minor amount of glycerine may be used in conjunction with the second category, i.e., polyester-polyol co-polymers, Szukiewicz never mentions that it is desirable to use glycerine when vegetable oils or polyalkylene glycols are used, as disclosed in the first and third categories, respectively. Thus, Szukiewicz does not teach or suggest the combination

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of glycerine with vegetable oil-based polyols as taught and claimed by Applicant. If the Examiner still insists that Szukiewicz teaches use of glycerine in conjunction with vegetable oil-based polyols in the exact amount as presently claimed, Applicant respectfully request that the Examiner kindly point to the text in the Szukiewicz patent where such specific teaching is made.

Indeed, as Applicant pointed out in previous Response filed January 27, 2009, Szukiewicz discourages use of polyols with molecular weight below 300. The chemical formula of glycerine is  $C_3H_5(OH)_3$ , with a molecular weight of about 92. Szukiewicz teaches that “polyols having molecular weights below 300 are too brittle” to be used. *See* lines 26-31, Col. 2. Thus, Szukiewicz actually teaches away from the use of glycerine.

The Examiner also asserts that the glyceride taught in Szukiewicz can turn into glycerine naturally. Applicant respectfully disagrees. Just because glycerine may be made from glycerides does not mean that glycerides can be naturally converted into glycerine. Many chemical reactions do not occur even when all the reactants are present because other conditions, such as temperature, pressure or catalyst may be required for the reactions to proceed.

Even if we assume that the glycerides of Szukiewicz can naturally hydrolyze to produce glycerine, no water can be found to complete the hydrolysis. This is so because Szukiewicz specifically teaches that the solvent for the reaction should be water-free and never teaches addition of water to the reaction mixture. *See* lines 14-15, Col. 3.

Even if glycerine is present in the mixture disclosed by Szukiewicz, the exact range of weight ratio between glycerine and the polyols is not taught by Szukiewicz. Taken together, because not all claim limitations are taught by Szukiewicz, withdrawal of the §102(b) rejection is respectfully requested.

#### **V. Claim Rejections – 35 U.S.C. §103(a)**

Claims 1-7, 9-11, 13-16, 20-27, 29-30, 32-60, 63, 67-70, 72-74, and 78-83 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Szukiewicz. Applicant respectfully traverses this rejection and requests withdrawal of same.

Under the same factual inquiries as required by Graham as elaborated in Section III, the Examiner need to first ascertain the difference between the rejected claims and the invention claimed in the cited art. As explained above in Section IV, substantial difference

exists between the instant claims and the invention disclosed in Szukiewicz. The claim limitations reciting the use of a low molecular weight polyol or glycerine as a crosslinker and the specific amounts of these crosslinkers as recited in the amended claims are not disclosed or suggested in Szukiewicz.

For example, Claim 1 recites glycerine in an amount ranging from 5 part per hundred to 30 parts per hundred by weight of the vegetable oil-based polyol, and Claim 52 recites glycerin in an amount of from 5 pph to 10 pph by weight of the soy polyol. Rejected claims 29, 39 and 52 and their dependent claims recite the use of a low molecular weight polyol in a specific amount as a crosslinker. For instance, Claim 29 recites that the low molecular weight polyol is present at 1 pph to 10 pph based upon weight of said vegetable oil-based polyol. By contrast, Szukiewicz does not mention a crosslinker comprising a low molecular weight polyol as defined, nor does Szukiewicz disclose the use of glycerine in the amount claimed by the Applicant.

Given the significant differences between Applicant's claimed invention and the cited art, the Examiner shall bear the initial burden to explain why such differences would have been obvious to one of ordinary skill in the art at the time of Applicant's invention. The Examiner has not provided reasoning as to why such differences between Applicant's claimed invention and the cited art would have been obvious to one of skill in the art. Indeed, the Examiner would not have provided any reasoning because the Examiner has not recognized that substantial differences exist between Applicant's claimed invention and the Szukiewicz invention. The Examiner repeatedly stated that the minor amount of glycerin disclosed in Szukiewicz encompasses the instant claims, ignoring the fact that Szukiewicz merely mentions that a minor amount of glycerine may be used in conjunction with the polyester-polyol co-polymers which is different from the vegetable oil based polyols as taught and claimed by Applicant. Moreover, as discussed in the previous section, the Examiner fails to provide evidence showing that the glycerides of Szukiewicz would naturally turn into glycerin even in the face of repeated warning by the Szukiewicz patentee that water-free solvent should be used, as discussed in Section IV. Thus, because substantial differences exist between Applicant's claimed invention and the cited art, and the examiner has not carried the initial burden showing that these differences would have been obvious to

one of ordinary skill in the art at the time of the invention, withdrawal of the obviousness rejections over Szukiewicz is respectfully requested.

For the foregoing reasons, Applicant is respectfully seeking a Notice of Allowance in the next Office Communication. Applicants' attorney urges the Examiner to telephone if a conversation could expedite prosecution. The fee for an RCE and 2 month extension of time is submitted herewith. The Commissioner is authorized to charge any additional required fees to deposit account 12-0600.

Respectfully submitted,

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